

Health Consultation

HERBICIDE CONTAMINATION ON RESIDENTIAL PROPERTIES IN
DEARBORN, MICHIGAN

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

HERBICIDE CONTAMINATION ON RESIDENTIAL PROPERTIES IN DEARBORN, MICHIGAN

Prepared By:

Michigan Department of Community Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Summary

An herbicide was applied to residential properties in the city of Dearborn in an apparent act of vandalism causing damage to lawns and other vegetation. The Michigan Department of Community Health (MDCH) compared levels of the herbicide tebuthiuron detected in residential soils to health-based screening levels. The levels of tebuthiuron in soil on affected residential yards in the city of Dearborn present **no apparent current public health hazard** to people living on or visiting these properties.

Purpose and Health Issues

The U.S. Environmental Protection Agency (EPA), Region 5, Emergency Response Branch requested that the Michigan Department of Community Health (MDCH) assist in evaluating the potential human health hazards at several residential properties in the city of Dearborn, Michigan. Initially, it was thought that the herbicide bromacil was sprayed on residential yards in an act of vandalism. Subsequent soil sampling in the yards determined that the contaminant was actually tebuthiuron, a nonselective, soil-activated herbicide (EPA 1994). EPA requested that ATSDR/MDCH identify a soil screening value protective of potential human exposures in a residential scenario. This consultation presents the results of ATSDR and MDCH's conclusions regarding the health hazards associated with exposure to tebuthiuron in soil on residential properties in Dearborn, Michigan.

MDCH conducted this health consultation for the federal Agency for Toxic Substances and Disease Registry (ATSDR) under a cooperative agreement. ATSDR conducts public health activities (assessments/consultations, advisories, education) at sites of environmental contamination and concern.

Background

Residents in Dearborn, Michigan indicated to EPA that in September 2006, an individual allegedly sprayed an herbicide onto residential properties for the purpose of destroying lawn and other yard vegetation. The affected residents are concerned for the health and safety of themselves and their families. They have also reported that vegetation in their yards is dead or dying and they are concerned about using the affected areas (EPA 2007).

Initially it was thought that a product containing the active ingredient bromacil had been sprayed on the yards, but soil sampling indicated the presence of tebuthiuron. Tebuthiuron is a broad spectrum herbicide used to control woody and herbaceous weeds in road rights-of-way and on industrial properties (EPA 1994).

Discussion

Environmental Contamination

On July 12, 2007, the Michigan Department of Agriculture (MDA) collected soil samples from four affected properties. Table 1 provides the results of this sampling effort in parts per million (ppm).

Table 1. Tebuthiuron Concentrations Detected in Soil Samples Collected from the Dearborn Residential Properties on July 12, 2007

| Soil Samples Location | Sample Depth | Concentration (ppm) | ATSDR Reference Dose Media Evaluation Guide (ppm) | MDEQ Residential Soil Direct Contact Criteria (ppm) |
|-----------------------|--------------|---------------------|---|---|
| Residence One | 0-4 inches | 70 | 4,000 | 4,600 |
| | 4-8 inches | 200 | | |
| | 8-12 inches | 200 | | |
| Residence Two | 0-4 inches | 0.08 | 4,000 | 4,600 |
| | 4-8 inches | 0.06 | | |
| Residence Three | 0-4 inches | 0.3 | 4,000 | 4,600 |
| | 4-8 inches | 0.07 | | |
| Residence Four | 0-4 inches | 2 | 4,000 | 4,600 |
| | 4-8 inches | 8 | | |
| | 8-12 inches | 9 | | |

The lawn and other vegetation at Residence One appeared to be the most stressed. The resident reported that he had replaced some soil in the damaged areas in an effort to revitalize the yard, which likely diluted the original concentration of tebuthiuron in surface soils. In addition, since the soil samples were composites, some uncertainty existed regarding the maximum concentration in the yard. To be certain that worst-case concentrations had been evaluated, the ATSDR/MDCH recommended that additional samples be collected and analyzed for tebuthiuron.

On August 2, 2007, the EPA collected four additional samples from Residence One. Table 2 shows the results of this later sampling effort. No tebuthiuron was detected in one additional sample taken from a near-by yard.

Table 2. Tebuthiuron Concentrations Detected in Surface Soil Samples Collected from the Dearborn Residential Properties on August 2, 2007

| Soil Samples Location | Concentration (ppm) | ATSDR Reference Dose Media Evaluation Guide (ppm) | MDEQ Residential Soil DCC (ppm) |
|----------------------------|---------------------|---|---------------------------------|
| Residence One - Front Yard | 39 | 4,000 | 4,600 |
| Residence One - Front Yard | 0.6 | | |
| Residence One - Side Yard | 1 | | |
| Residence One - Side Yard | 7 | | |

Detected levels of tebuthiuron are well below the ATSDR Reference Dose Media Evaluation Guide (RMEG) of 4,000 ppm for children and 50,000 ppm for adults. An RMEG is the concentration of a contaminant in air, water or soil to which humans may be exposed without experiencing adverse health effects. RMEGs are developed using an EPA non-cancer reference dose (RfD) and default exposure assumptions for children and adults.

In addition, the highest concentration of tebuthiuron reported (200 ppm) is also well below the Generic Residential Soil Direct Contact Criterion (DCC) of 4,600 ppm for tebuthiuron promulgated by the Michigan Department of Environmental Quality (MDEQ 2006). The DCC identifies a soil concentration that is protective against adverse health effects due to long-term, daily ingestion (eating) of and dermal (skin) exposure to contaminated soil. The Residential DCC is protective of both children and adults.

Exposure Pathways Analysis

To determine whether persons are, have been, or are likely to be exposed to contaminants, MDCH evaluates the environmental and human components that could lead to human exposure. An exposure pathway contains five elements:

- a source of contamination
- contaminant transport through an environmental medium
- a point of exposure
- a route of human exposure
- a receptor population

An exposure pathway is considered complete if there is evidence, or a high probability, that all five of these elements are, have been, or will be present at a site. It is considered either a potential or an incomplete pathway if there is no evidence that at least one of the elements above are, have been, or will be present, or that there is a lower probability of exposure. Table 3 shows the exposure pathways of potential concern at the Dearborn site.

Table 3. Exposure Pathway for Tebuthiuron-Contaminated Soil on Residential Properties in Dearborn, Michigan.

| Source | Environmental Transport and Media | Chemicals of Concern | Exposure Point | Exposure Route | Exposed Population | Time Frame | Status |
|-----------|-----------------------------------|----------------------|----------------------------|--------------------------------------|--------------------|------------|----------|
| Herbicide | Application to Soil | Tebuthiuron | Soil in residential yards. | Incidental ingestion, Dermal contact | Residents | Past | Complete |
| | | | | | | Current | Complete |
| | | | | | | Future | Complete |

Toxicological Evaluation

The ATSDR RMEG and the MDEQ Residential DCC for tebuthiuron are calculated using the EPA RfD of 0.07 milligrams per kilogram of body weight per day (mg/kg-d). The RfD is derived from a study in which groups of rats were fed tebuthiuron in their diets for up to 121 days, and then for a further period of time to allow them to mate and rear two successive generations of offspring. No developmental, reproductive, or carcinogenic effects were observed. The only adverse effect noted was depressed body weight in the second generation of female rats (Elanco 1981).

Inhalation exposure risk to residents living on affected properties in the city of Dearborn is not considered to be significant because tebuthiuron is inefficiently absorbed by the respiratory tract. Residents could be exposed to tebuthiuron through incidental ingestion (eating) of and dermal

(skin) contact with contaminated soil. However, levels of tebuthiuron detected in soil on these properties are well below health-based screening levels developed by ATSDR and the MDEQ.

Children's Health Considerations

Children may be at greater risk than adults from certain kinds of exposure to hazardous substances at sites of environmental contamination. They engage in activities such as playing outdoors and hand-to-mouth behaviors that increase their exposure to hazardous substances. They are shorter than adults, which means they breathe dust, soil, and vapors close to the ground. Their lower body weight and higher intake rate result in a greater dose of hazardous substance per unit of body weight. The developing body systems of children can sustain permanent damage if toxic exposures are high enough during critical growth stages. Prenatal exposures and those that occur in the first few years of life are more likely to cause permanent damage.

Children are expected to be present on the affected residential properties and could be exposed to tebuthiuron in soil while playing in their yards. It is not known if children are more sensitive than adults to the potential health effects of tebuthiuron. However, the levels of tebuthiuron detected in soils are well below health-based screening levels that are protective of children.

Conclusions

The levels of tebuthiuron detected in soil on affected residential yards in the city of Dearborn present **no apparent current public health hazard** to people living on or visiting these properties. It is possible that tebuthiuron levels were higher immediately after the herbicide was applied. However, given that levels are 10-fold or more below health-based screening values; it is not likely that anyone will experience adverse health effects as a result of exposure to tebuthiuron at this site.

Recommendations

No further actions are recommended at this site to protect public health.

Public Health Action Plan

MDCH will remain available as needed for future consultation at this site.

If any citizen has additional information or health concerns regarding this health consultation, please contact MDCH's Division of Environmental Health at 1-800-648-6942.

Preparers of Report

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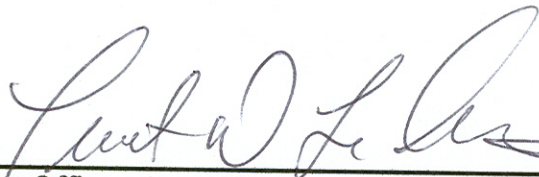
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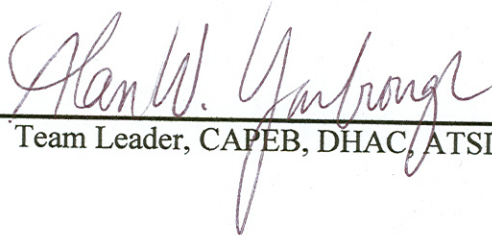
Certification

This Health Consultation was prepared by the Michigan Department of Community Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures. Editorial review was completed by the cooperative agreement partner.



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The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.



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